

# Sequential Circuit Design

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## 1 Administrivia

### Announcements

Collect assignment.

### Assignment

Read 6-7.

New written assignment.

### From Last Time

Sequential circuit analysis.

### Outline

1. Sequential circuit design process.
2. Unused states.
3. Examples.

## Coming Up

VHDL for sequential circuits.

## 2 Sequential Circuit Design Process

1. Obtain a state diagram. Assign binary numbers to the states (a non-trivial problem, actually).
2. Obtain a state table.
3. Derive flip-flop input equations from the next state entries and output equations. Simplify.
4. Draw your schematic.

## 3 Unused States

Suppose your design has 6 states:

1. Two unused states.
2. What happens if the circuit enters one of these states?

## 4 Examples

1. Sequence recognizer for 010.
2. Serial comparator. Inputs: A, B, msb. A and B are received least significant bit first. Receipt of msb is co-incident with msb's of A and B and resets circuit to begin next comparison. Output 0 if  $A \geq B$ , otherwise 1.
3. Serial comparator. Inputs: A, B, lsb. A and B are received most significant bit first. Receipt of lsb is co-incident with lsb's of A and B and resets circuit to begin next comparison. Output 0 if  $A \geq B$ , otherwise 1.